

**FY-2001 PROPOSED SCOPE OF WORK for:**  
Translocation of Northern Pike from the Yampa River

**Project #:** 98

Lead Agency: Colorado Division of Wildlife (CDOW)

Submitted by: Thomas P. Nesler  
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Category:

- ☒ Ongoing project  
☐ Ongoing-revised project  
☐ Requested new project  
☐ Unsolicited proposal

Expected Funding Source:

- ☒ Annual funds  
☐ Capital funds  
☐ Other (explain)

I. Title of Proposal:

Nonnative Fish Control: Translocation of Northern Pike from the Yampa River.

II. Relationship to RIPRAP:

Green River Action Plan: Yampa and Little Snake rivers

III.A. Develop aquatic management plan to reduce nonnative fish impacts while providing sportfishing opportunities.

III.A.1. Implement aquatic wildlife management plan.

III.A.1.a.(1) Evaluate control options and implement measures to control nonnative fish escapement from existing Elkhead Reservoir.

III. Study Background/Rationale and Hypotheses:

Northern pike, *Esox lucius*, are a nonnative species that accidentally became established in the Yampa River in the early 1980s. Originally introduced as a game fish in Elkhead Reservoir in 1977, the species escaped and invaded the Yampa River via Elkhead Creek which is located about 5 miles upstream of Craig, Colorado. Since then, northern pike have established a reproducing population in the upper Yampa River and have expanded their number and range within the Yampa and Green rivers. Pike now occur throughout the

Yampa River in critical habitat and in areas upstream of Craig that contain off-channel habitat suitable for their reproduction (Nesler 1995). Many large adult pike move downstream from this reach into occupied critical habitat where they pose a competitive and predatory threat to the endangered fishes. In addition, northern pike are also a significant predation threat to other "at risk" native species such as roundtail chub (Martinez 1995).

The Recovery Program for Endangered Fishes in the Upper Colorado River Basin (Recovery Program) has determined that control of nonnative fishes is necessary for recovery of the endangered fishes in the Upper Basin. Northern pike were rated as one of six nonnative species of greatest concern by experts in the Upper Colorado River Basin based on the potential effects of pike predation on endangered and other native fishes (Hawkins and Nesler 1991). The Colorado Division of Wildlife (CDOW) has an Aquatic Wildlife Management Plan for the Yampa River Basin (Yampa Aquatic Plan) that includes management of northern pike (CDOW 1998). Management activities in the Yampa Aquatic Plan recommend active trapping and translocation of northern pike, small-mouth bass, channel catfish, and white sucker.

Radio-telemetry and mark-recapture records of pike in the Yampa River indicate that pike use flooded backwaters and sloughs during runoff and that most pike (78%) tend to remain in one mile sections of river (Nesler 1995). Sexually mature pike are especially vulnerable to capture as they move from the main channel into off-channel spawning areas (Mann 1980). This study will implement removal of northern pike and determine its effectiveness. Sampling will occur from April through June when pike are seeking off-channel habitat for spawning or for pre- and post-spawning conditioning. We will employ and enhance capture techniques proven effective for capturing northern pike in other Recovery Program studies. Nesler (1995) used electrofishing in conjunction with blocking the mouth of tributaries and the razorback monitoring program has used fyke nets in tributaries; both techniques were effective for capturing large numbers of pike. For example, razorback monitoring while sampling for adult razorback sucker incidentally captured about 60 northern pike each year in 1996, 1997, and 1998 using fyke and trammel nets set in backwaters and tributary mouths. Most of these captures were in the Middle Green River, an area that apparently has fewer northern pike than the Yampa River; therefore, it is likely that many more northern pike will be captured in the Yampa River using similar techniques.

#### IV. Study Goals, Objectives, End Product:

##### Goal

The goal of this project is to improve the survival of endangered fishes in the Yampa and Green Rivers by reducing the number of large, adult, northern pike and reducing their reproduction in the Yampa River.

##### Objectives

1. Reduce or prevent spawning of northern pike within a primary spawning area of the Yampa River.

2. Remove adult northern pike from primary spawning areas in the upper Yampa River.
3. Remove juvenile and adult northern pike from critical habitat reaches in the Yampa River.
4. Translocate northern pike as per Nonnative Stocking Procedures to an off-stream fishery that is accessible to Yampa Valley fishermen.
5. Determine effectiveness of removal within each reach.

V. Study Area:

The study site includes the Yampa River from approximately Hayden, Colorado (RM 160) to the head of Yampa Canyon (RM 46). The areas sampled will include a primary spawning reach near Hayden and the critical habitat reach in the lower Yampa River. The spawning reach is approximately 10-miles long and located between Highway-40 bridge east of Hayden downstream to Hayden (RM 171-160). Most of this reach is owned or managed by the Colorado Division of Wildlife (CDOW) or The Nature Conservancy (TNC). Critical habitat contains three geomorphically distinct reaches. The Juniper Reach is located from Round Bottom, which is downstream of Craig, Colorado to Juniper Canyon (RM 120-93). The Maybell reach is located from Juniper Canyon to Cross Mountain Canyon (RM 93-64) and the Lily Park Reach is located from Cross Mountain Canyon to the entrance of Yampa Canyon (RM 64-46). Yampa Canyon is excluded because another Recovery Program project is removing nonnatives in that reach.

Sampling Dates: Removal of northern pike from the Hayden Reach will occur in early spring, between April and June. Removal in critical habitat will occur in spring between May and July. Actual sampling dates will coincide with peak runoff when targeted habitats (backwaters, tributaries, and sloughs) are flooded.

VI. Study Methods/Approach:

We will collect northern pike intensively for about 8 weeks in the early spring during the ascending limb of the hydrograph. During this period, pike typically congregate in off-channel habitats such as backwaters and sloughs for spawning, feeding, or resting. We will use sampling gears and techniques that exploit this behavior. Removal will focus on two areas: a 10-mile long, primary spawning reach (Hayden Reach) and critical habitat (RM 45-120). Sampling gear will include fyke net, trammel net, seine, and electrofishing. Electrofishing and seines will be used to herd fish into the passive gears, as per "block and shock" techniques described by Nesler (1995).

The approach used to sample the spawning reach will be different from the approach used in critical habitat due to different logistical concerns in each area. The Spawning Reach will be sampled primarily by fyke nets and the Critical Habitat Reach will be sampled primarily by block-and-shock electrofishing. In addition, sites in the Spawning Reach will be sampled continuously during each sampling trip while sites in the Critical Habitat Reach will be sampled once during each sampling trip. Sites in the Critical Habitat Reach will also be

sampled systematically, in a downstream direction. In Critical Habitat, constant net sets are not practical because sampling sites are widely spaced by several river miles and there is a greater potential for vandalism.

The spawning reach will be sampled continuously as pike attempt to spawn. Each sampling trip will begin with a survey of the reach to identify all acceptable habitats (backwaters) in the reach. Three backwaters will be randomly selected on each trip and the entrance of each backwater will be blocked with fyke nets to capture fish moving into the backwater. Every 24-48 hours, nets will be checked and fish removed and processed. After nets are set or checked as required, the crew will sample critical habitat reaches. At the end of each week, all nets will be removed until the next sampling trip. The next sampling trip to the spawning area will repeat the process. Each week, target backwaters will be sampled with dipnet, seine, or light trap to determine if pike reproduction was successful based on the presence of larval pike. Simple habitat measurements will be taken at each site sampled. This will include a map sketch, photographs, and a description of the site. Habitat area and area of emergent or submerged vegetation will be estimated. We will also measure depth, mouth width, and substrate of each target backwater.

Prior to runoff, in the critical habitat reaches of Juniper, Maybell, and Lily Park we will identify locations of all backwaters and obtain landowner permission for access to those on private property. We will start at the most upstream reach and sample all available backwaters or flooded tributaries sequentially in a downstream direction. At the beginning of each week, sampling will start where it finished the previous week and continue until the downstream reach (Lily Park) is sampled, then we will return to the upstream reach (Juniper) and start over. Sampling will continue for up to eight separate sampling trips, each about one week long.

Each backwater in Critical Habitat will be sampled by blocking the mouth with a fyke or trammel net and then seining or electrofishing to herd fish into the capture net. Each backwater will be sampled until most (preferably all) pike are removed. In smaller backwaters this will probably require at least three sampling passes. Larger or more complex backwaters, will be sampled with up to five or six sampling passes to remove pike. All passes will be conducted on the same day. After the last sampling pass, the block nets will be removed and all fish processed. After a backwater is depleted of pike, we will continue to the next backwater and repeat the procedure. After all accessible backwaters in all reaches are sampled, we will return to the upstream reach and start over, moving in a downstream direction and sampling each backwater. We will attempt to sample all accessible backwaters within Critical Habitat on at least three separate sampling occasions.

All target species will be measured and weighed. Endangered fishes will be PIT tagged, handled, and processed as per ISMP and Recovery Program protocols. Pike will be Floy tagged to allow CDOW to track their growth and movement at the translocation site. All native fishes will be released alive at site of capture. Salmonids will be released at site of capture, while other nonnative gamefish such as northern pike, smallmouth bass, and channel catfish will be handled and possibly translocated to other waters as per approved CDOW stocking plans.

Translocation sites for nonnative gamefish will be determined by the CDOW and identified in an approved Stocking Plan. The Yampa Aquatic Plan recommends translocation of northern pike, smallmouth bass, and channel catfish to locations within the Yampa Basin in order to maintain a local fishery. The CDOW will locate and negotiate suitable private or public waters for translocating these fish. The handling protocol for transporting pike to other waters will be developed by CDOW.

We will conduct population estimates for northern pike in each critical habitat reach by using a depletion (or removal) estimate (White et al. 1982). Population estimates will be obtained for each backwater on each sampling occasion and each reach. The population estimate in each backwater will allow us to evaluate the re-colonization of individual backwaters over time. Each reach will be sampled completely at least three times during the high flow period. The reach population estimate will be completed at the end of each field season, so there will be an estimate of the pike population for each year of the study. The population estimate will provide a baseline to compare the number of pike removed relative to the total estimated number. This will indicate what portion of the population was removed so that managers can determine if the removal program was successful or not. With an estimate each additional year, we will be able to monitor changes in the population over time (each year).

We will also calculate population estimates in each backwater to determine our effectiveness at sampling, especially in larger backwaters. As a by-product of thoroughly sampling each backwater with multiple passes to catch and remove as many pike as possible, we will be able to estimate the number of pike in a backwater each time it is sampled. This will inform us about our efficiency of sampling and will provide quantitative data to identify if the number of pike decreases through time as we return and re-sample the same backwaters.

#### Evaluation

1. The population size and total biomass of northern pike will be estimated for each backwater.
2. Effectiveness of removal will be determined by comparing the number of northern pike removed to the estimated population size for each reach.
3. Catch per unit effort will be calculated to identify how many additional northern pike are captured with each increase in sampling effort.
4. The length of northern pike captured each week will be examined to determine if the size distribution of northern pike captured changes with each successive sampling trip.
5. Successful removal should result in a decrease in catch rates of northern pike collected by ISMP sampling the following year.

#### Expected Results

1. Suitable sites and willing landowners will be identified for receiving pike.

2. Large numbers of northern pike will be removed from the Yampa River.
3. Large numbers of northern pike will be translocated to locations that are suitable for fishing.
4. The number of northern pike in each reach of Critical Habitat will be estimated.
5. Increased knowledge of pike behavior and capture efficiency so that future sampling can exploit seasonal and daily behavior.
6. Increased knowledge about the logistics of pike transport and whether volunteer help is available and sufficient for transporting pike.

VII. Task Description and Schedule:

Task 1.	Oct - Mar	Locate private or public ponds for receiving translocated fish and obtain easements to these sites. (CDOW)
Task 2.	Oct - Mar	Submit Stocking Management Plans for approval. (CDOW)
Task 3.	Jan - Mar	Contact private landowners and obtain permission for property access for fish removal sampling. Field crew training and equipment preparation. (CDOW & CSU)
Task 4.	Apr - May	Capture, remove, and translocate northern pike from the spawning reach. (CSU)
Task 5.	May - Jun	Capture, remove, and translocate juvenile and adult northern pike from critical habitat reaches. (CSU)
Task 6.	Jul - Sep	Data entry and analysis. Equipment maintenance (CSU)
Task 7.	Dec	Prepare Recovery Program annual progress report and final report. (CSU)

VIII. FY-2001 Work:

Deliverables/Due Dates:

- |    |  |         |
|----|--|---------|
| 1. | Recovery Program annual progress report: | 12/2001 |
| 2. | Draft Final Report                       | 11/2001 |
| 3. | Final Report                             | 01/2002 |

### FY-2001 Budget Estimate

Labor (Salary and benefits for 4 crew members) . . . . .	49650
Truck Rental (1 truck-6 months, 1 truck-3 months) . . . . .	1800
Truck Mileage . . . . .	2000
Travel (Lodging and per diem) . . . . .	6850
Equipment and supplies	
Boat Gas & Oil . . . . .	1280
Fish Transport Supplies . . . . .	500
Misc. equipment . . . . .	1200
Supplies . . . . .	1000
L.D. Phone . . . . .	<u>300</u>
Sub-Total . . . . .	64,580
Overhead (15%) . . . . .	<u>9,690</u>
Total . . . . .	74,270

### FY-2001 Budget by Task

Task 1: CDOW will cover these costs.

Task 2: CDOW will cover these costs.

Task 3:	Labor	6900
	Travel*	2600
	Misc**	<u>300</u>
	Total	9800

Tasks 4&5:	Labor	28,200
	Travel	7750
	Boat Gas/Oil	1280
	Equipment	1700
	Misc	<u>650</u>
	Total	39,580

Task 6:	Labor	9750
	Travel	300
	Misc	<u>200</u>
	Total	10,250

Task 7:	Labor	4800
	Misc	<u>150</u>
	Total	4950

Sub-Total	64,580
Overhead(15%)	<u>9,690</u>
TOTAL	74,270

\* Travel includes Truck Rental, Mileage, Lodging, and Per diem.

\*\*Misc. includes Supplies, and Long Distance Phone.

FY-2002 Work (for multi-year study)

Budget Estimate                      unknown

IX. Budget Summary:

	<u>Project Cost</u>
FY-2000	\$ 95,715
FY-2001	\$ 74,270
FY-2002	\$ unknown

X. Reviewers of original (FY-99) SOW:

Ron Brunson (UDWR), Patrick Martinez (CDOW), and Chuck McAda (FWS)

XI. References:

CDOW (Colorado Division of Wildlife). 1998. Aquatic Wildlife Management Plan: Yampa River Basin, Colorado. Colorado Division of Wildlife, Aquatic Wildlife Section, Denver.

Hawkins, J. A. and T. P. Nesler. 1991. Nonnative fishes of the Upper Colorado River Basin: an issue paper. Larval Fish Laboratory, Colorado State University, Ft. Collins, Colorado.

Mann, R. H. K. 1980. The numbers and production of pike (*Esox lucius*) in two Dorset rivers. Journal of Animal Ecology 49:899-915.

Martinez, P. J. 1995. Coldwater Reservoir Ecology. Colorado Division of Wildlife Federal Aid in Fish and Wildlife Restoration Project. # F-242R-2, Job Final Report, Ft. Collins.

Nesler, T. P. 1995. Interactions between endangered fishes and introduced game fishes in the Yampa River, Colorado, 1987-1991. Final Report. Colorado River Recovery Implementation Program Project number 91-29, Federal Aid Project SE-3. Colorado Division of Wildlife, Aquatic Research Section, Ft. Collins, Colorado.

White, G. C., D. A. Anderson, K. P. Burnham, and D. L. Otis. 1982. Capture-recapture and removal methods for sampling closed populations. Los Alamos National Laboratory, LA-8787-NERP, Los Alamos, New Mexico.